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ABSTRACT

A course was developed to provide data to buyers of new bicycles so they could make an informed decision about their purchases. The instructional systems design process (analysis, design, development, implementation, and evaluation) was used to analyze the need for a training course on buying and fitting a bicycle. Information was collected through a literature review and questionnaires and interviews with cyclists and shop owners to show that a training course was suitable for learning the subject. An instructional task analysis linked the course segments to the behaviors identified in the analysis phase. The designer listed four instructional objectives, defined the entry behaviors, and sequenced the four lesson segments. Media for instruction were chosen, and the lesson was explained in terms of Gagne's nine steps of instruction. The designer provided specifications for assessment, evaluation, and learning transfer. The designer assembled a student manual, instructor guide, and posttest for the course, which would be delivered in a lecture format. Six individuals participated in the implementation stage in November 1990. The formative evaluation consisted of a small group and a pilot test. Higher posttest scores for the test group when compared with a control group of nine individuals showed some learning had taken place. (Appendixes include a bicycle buying questionnaire, job task analysis, student manual, instructor's guide, posttest, and 25 references.) (YLB)

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The Faculty of the
School of Media and Arts
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accepts the
Thesis/Project

BICYCLE PURCHASER TRAINING WORKSHOP

This project was conducted using the principles and techniques of instructional system design (ISD). The document is a report of the designer's plans and experiences in carrying out the design, development, implementation, and evaluation of the project. A plan, budget, analysis of findings, and recommendations are included.

written by

William Schwarz

in partial satisfaction
of the requirements for the degree of

Master of Science

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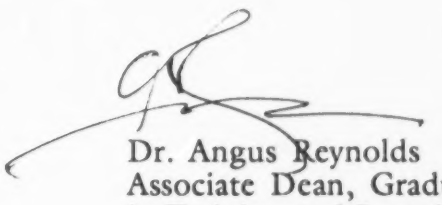

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January 15, 1991

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BICYCLE PURCHASER TRAINING WORKSHOP

by

William Joseph Schwarz

B.A. 1971, University of Delaware

A Thesis/Project

submitted to The Faculty of the

School of Media and Arts

of the New York Institute of Technology in partial satisfaction
of the requirement for the degree of

Master of Science

January 15, 1991

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CHAPTER 1

INTRODUCTION

Overview

Complex modern products often require that buyers know their features prior to actual purchases. There is often such an array of choices that consumers rely on instruction (a book, a magazine article, or a lecture course) to help narrow their options. For this reason, colleges have had courses, for example, in investment strategy ("How to" purchase stocks and bonds). College extension courses list home buying and other "practical" skills.

Another example: The Learning Annex is one of several New York-based "quick education" establishments which specialize in single-night courses on relevant topics. It has provided instruction for those planning to obtain computers or cameras. This course project gave learners basic information for purchasing a bicycle.

Background

One organization that has been giving instruction for bicyclists is the New York Council of American Youth Hostels (AYH), a national nonprofit group dedicated to outdoor recreational activity for young people. It is affiliated with the International Youth Hostel Federation (IYHF), the umbrella

organization that runs the European hostels with which many Americans are familiar. AYH provided its service mainly by means of low-cost accommodations, but also gave group tours for cycling, hiking, and skiing. The term "youth hostel" is a bit of a misnomer, since people of all ages were welcome to use the hostels and their programs.

Among the New York City AYH chapter's efforts was a long-standing bicycle repair and maintenance course. It was a recognition of the need for traveling recreational bicyclists to know enough of their machines to handle small breakdowns, and to recognize how to avoid major mechanical trouble. Courses lasted four hours and covered the following topics:

1. Bicycle parts and tools to use
2. Fitting the bicycle to the rider
3. Repair of a flat tire
4. Brake and gear adjustment.

AYH's bicycle repair teachers were normally people who were volunteers for the organization, although they were paid for their instruction. They included the designer of this project. Courses were given in the evenings and on weekends because most of the teachers had other occupations. This was also true of the students, who paid for the instruction and thus had an incentive to learn. There was a wide age range among the attendees, as well as a wide mix of occupations, from high schoolers to factory workers to professors.

Most of the students were looking for self-sufficiency in

their bicycle maintenance skills. They didn't want their machines sitting in a shop for repairs when they could accomplish the tasks themselves and be riding again. Others had recently acquired a bicycle, or were planning to buy one, and were looking for background information. It is to this audience that the designer geared his new curriculum, a one hour course with these four topics:

1. Naming of bicycle parts
2. Different types of bicycles
3. Fitting the bicycle to the rider
4. Specialized tools, accessories, and clothing.

Statement of the Problem

Often a person will "read up" on a complex subject to be armed with information. That way, there won't be a bad deal due to that person's lack of knowledge. Home buying and a car purchase are examples. A bicycle buyer is also better off knowing the choices on the market. There have been plenty of publications (books and magazines) for cyclists which often contained articles like "How to Shop for a Shop" or "Five Ways to be Sure You Buy the Right Bike." Bicycling magazine, the most popular of the periodicals, has featured an annual Buyer's Guide. It usually contained articles about the pitfalls of making an uninformed purchase. These stories have explained that bicycle store salespeople don't fit the stereotype of the "used car salesman." However, they could steer unsuspecting purchasers to

wrong models or sizes, especially if it was the busy late-spring season when the shops had peak traffic and staffs were stretched thin.

Along with automobile buyers who have had troubles with their purchases, new bicycle owners have been "burned," too. That fact was documented in two separate articles in Bicycling magazine during 1989 and 1990. One (Kukoda, March 1989, p. 71) began, "I bought a lemon!" and reported, "Most shop owners can tell stories of customers angrily returning bikes, complaining of loose cranks [pedal arms], wobbly wheels, and derailleurs [gear changers] which no longer shift." The author recommended patronizing a shop which gave a free tuneup after 30 days.

The second article, (Langley, March 1990, p. 162) listed "Five ways most buyers get burned: Not knowing your needs, shopping until you drop, faulty fit, going without goodies [accessories], and keeping quiet." Fortunately, the author gave correct ways to approach the purchase. These stories gave one indication that a need existed for a course for new bicycle purchasers.

The designer intended that this course be a part of AYH's bicycle repair program. It would have been the first time one of those courses had a thorough assessment and evaluation. However, during the summer of 1990, due to local financial difficulties, the organization's national council took over the New York chapter's assets. To cut costs, it eliminated the

outdoor programs and concentrated its energies and staff on running the new hostel building on Amsterdam Avenue. Even the repair courses, which had been money-makers for AYH, were phased out. The designer was left to his own devices: Having to advertise with bicycle publications and touring companies for students to take the course. He decided to offer the seminar, if evaluation verified its usefulness, to the Learning Annex or a similar part-time educational institution.

Purpose of the Project

"I'm constantly amazed at the number of people who wheel their bicycles into the shop each summer without the foggiest notion of what they're riding. It's a pet peeve of mine: Cyclists should be much more familiar with their bicycles," said Sam Braxton, a store owner and author of "The Bike Stop," a guide to riding a touring bicycle (Braxton, 1982, p. 1). The designer's own informal survey of those taking the AYH repair courses revealed that one-third of the participants were dissatisfied with the bicycles they purchased.

"Some first-time cyclists are intimidated by bike dealers and the technical jargon they use," according to Weaver (1987, p. 33). The course objective, then, was to provide data to buyers of new bicycles so they could make an informed decision about their purchases.

For students, the explicit objectives were:

1. Identify the correct type, size, and price range of bicycle

for their own needs.

2. Become assertive for when they enter a bicycle shop; be an "educated consumer."

For the designer, the explicit objectives were:

1. Justify the course as a profit-making venture.

2. Encourage students to use bicycles as a fitness activity.

The designer's implicit objectives were:

1. Encourage alternate means of transportation for New Yorkers. The April 1990 issue of Bicycling magazine listed New York City as the nation's worst urban area for cycling (Martin, p. 64). Transportation Alternatives, a cyclists' lobby, estimated that thousands of New Yorkers would use bicycles more often, except for the heavy traffic they would encounter. The designer expected that most students in the seminar would use their new purchases for vacations outside the city, but some might be encouraged to travel in the city by bicycle, or even commute that way.

2. To lessen dependence on automobiles and promote cleaner air. Every additional cyclist meant one less automobile, and the designer expected that some new cyclists would lobby for more healthful breathing conditions when they rode.

Definition of Terms

Fitting a bicycle to rider--The process of ensuring that the frame and other components of the bicycle match the body type of the rider, making usage more comfortable.

Crosstraining--Increasing one's overall fitness by involvement in two or more activities--for example, cycling and running.

Triathlon--Competition involving swimming, cycling, and running. Stages occur consecutively.

NOTE: All of the following terms appear in the instructor's guide (Appendix E) or the student manual (Appendix F).

Top tube--on a bicycle frame, the cylindrical part which extends from the handlebars to the seat.

Seat tube--on the bicycle frame, the cylindrical part which extends from the seat downward to the pedals.

Stem--L-shaped metal cylinder that connects the handlebar to the frame.

Tire irons--spoon-shaped metal tools used to remove a tire from a wheel.

Cone wrench--thin wrench used to adjust bearings in the wheel hubs.

Spoke wrench--small tool used to adjust spoke tension on wheels.

Freewheel--Tapered set of cogs on rear wheel for gears; also known as **cluster**.

Seat rails--two metal rods on the underside of a bicycle seat that allow fore-and-aft adjustment.

Allen wrench--six-sided wrench used with some recessed parts.

Bottom bracket--junction of frame tubes at the bottom of the bicycle, where the pedals are joined to the frame.

Toeclip--metal or nylon cage which keeps the ball of the foot on the pedal.

Component--general expression for part attached to frame, e.g. brake system, derailleur, or freewheel.

Assumptions

1. That there exists a sufficient market of adult first-time bicycle buyers to justify the continuation of this project.

2. That trainees have enough psychomotor skills to use a screwdriver, wrench, and tape measure properly.

3. That trainees are high school graduates.

4. That trainees are interested in learning about derailleur (multi-speed) bicycles, as opposed to machines of one or three speeds only.

Limitations

1. That this instructional module is created with a specific audience, new adult cyclists in the New York metropolitan area, and may not be suitable for use in other localities without appropriate modifications.

2. That finding adults who knew little or nothing about modern cycling may pose a problem in giving justifiable results in the evaluation. The designer expected that there would be many people who have a little knowledge about cycling; finding those who knew nothing posed a challenge.

Method and Procedures

The format of this project was based on instructional systems design--ISD (Center for Educational Technology, 1976). There are five steps in the process.

Analysis

The designer already had experience with some topics of the project, since they were covered in the AYH bicycle repair courses. He polled fifteen students of the 1990 sessions on the usefulness for a "buying and fitting" seminar, and the response was favorable. "I wish I'd had a course like that when I went into my shop," one student remarked.

The designer also polled bicycle shop personnel regarding the knowledge level of first-time buyers, and questioned another fifteen cyclists during group rides about what they felt they should have known when they started in the sport. These surveys showed that the best results for learning would occur during a training course.

Design

After the instructional analysis, the designer defined the course objective, to prepare adults who were new to cycling for their purchase of a bicycle. The entry behaviors were set out--adults who were new cyclists, or who had not cycled since childhood. The four topics of the instruction were grouped and sequenced. The designer wrote specific objectives for each segment, and then employed a media selection process.

Development

The subject matter for the project was composed of 20 years' experience by AYH bicycle repair instructors, as well as reference materials from publications during that time. The designer prepared the learning materials, an instructor's guide,

a student handout, and a post test, for the four course segments. The materials were constantly revised according to Gagne's (1985) nine instructional events.

Implementation

The designer's original intent was to present the course as a part of the AYH curriculum. Since those courses were no longer offered as of September 1990, he proceeded to enlist students from cycling clubs, tour companies, and other organizations. This necessitated smaller classes, since all were held in an apartment, not the classroom that would have been available.

Evaluation

Since the designer's intent was to provide new information to students, only a post test was included. The post test was closely related to the four parts of the lesson. A formative evaluation was employed to refine the topics and their presentation. The summative evaluation was used to determine whether the course would continue. The designer recruited a control group to compare to the post test results.

Summary

This introduction provided readers with an overview of the project. It characterized the learners, introduced the lessons to be given, outlined a history of the subject, and explained the rationale for the project. It also showed how the instructional system design (ISD) method was employed, and how the designer followed a formative and summative evaluation scheme.

CHAPTER 2

ANALYSIS

Overview

This chapter explains the different analyses which the designer completed for the project, including the needs assessment, definition of instructional goal, and literature review. A questionnaire regarding customer satisfaction with bicycle shop services is introduced. The designer's survey of the literature on the topic is included, as well as the project plan and budget.

Needs Analysis

Over the past ten years, the project designer and others who gave AYH bicycle repair courses heard an underlying current of discontent among bicycle owners. The disgruntled group felt that they lacked enough knowledge to decide correctly about the fit and type of their bicycles when they had made their purchases. Therefore, the designer prepared and distributed a survey to find how widespread this problem was.

This survey revealed that fully half the cyclists felt that they had not been properly fitted to their bicycles when they bought them. That's the most important step to riding comfortably and safely (Glenn, 1973, p. 8). Then there were almost 40 per cent who felt dissatisfied with repair work done in the shop where they made the purchase. See Table 1, which

tabulates the group results, and Appendix A, a sample of the questionaire.

Table 1

Bicycle Buying Questionnaire Results

n = 28

ISSUE	RESPONSE	NUMBER
1. Years owning present bicycle	Average	2.0
	Range	0.5 to 8.0
2. Proper fitting at the shop	Yes	14
at time of purchase	No	14
3. Satisfied with service at shop,	Very	9
at point of purchase or later	Somewhat	8
	Dissatisfied	11

One could argue that a solution came in the form of articles and book chapters that helped riders fit their bicycles and gave information about tools, accessories, and clothing. But the need for hands-on experience had always been the goal of the AYH repair and maintenance courses. No magazine article, no matter how richly illustrated, could give the same satisfaction to the bicycle owner as actually working with the machine.

The designer questioned fifteen cyclists during two New York Cycle Club rides in September 1990 regarding how they went about purchasing their first bicycles as adults. These were

verbal interviews, not written questionnaires. Ten stated that they read magazine articles before they went into any stores, and complained that the articles were too general and did not give specific rules for fitting and frame size. Seven of this group said that their bicycle fit was improper as a result. Of the five who did not read periodicals before purchasing, three said that the shop personnel left them with a wrong fit.

The designer asked, "How would the situation have been improved?" Nine of the group of fifteen responded that a course, similar to the repair sessions, would have been valuable. All nine said that they would pay for such instruction. Therefore, the designer substantiated that a training course, similar to those longstanding repair and maintenance courses that have wide acceptance, was necessary.

This course would have to satisfy a "macro" training need (Laird, 1985) since the instructional need existed for a large group of people, the general population, who would all start out with a similar background in the subject. There was no chance to individualize the instruction, considering the time and cost restraints.

Job Task Analysis

Zahradnick reported that beginning adult cyclists needed to know the right bicycle size and type for their needs. "Dealers tell us first-time buyers often come back within a year for a different bike, or they drift away from the sport altogether, perhaps because they bought an inappropriate bike" (Zahradnick,

1988, p. 62).

The designer realized that gaining information about types of bicycles and their fit to the rider were the most important tasks for new cyclists. He devised a task analysis sheet in order to determine the subtasks that novices would have to complete. He determined that intellectual skills comprised about 90 per cent of the activities, and motor skills the other ten per cent. Appendix B lists all the separate tasks related to the process of preparing to purchase a bicycle.

Target Population Analysis

In the marketing for the project's implementation stage, the designer targeted adults who were not cyclists presently but who intended to purchase bicycles. There were many adults who had not used bicycles since childhood who suddenly rediscovered cycling as a means to fitness. In addition, people who had started their fitness campaigns as runners switched to cycling: "It gets your heart pumping as well as running does, and with almost no stress on the joints" (Higdon, 1988, p. 36). Other runners became triathletes and had to know about bicycles, so even runners' magazines included articles about bicycles: "You'll be amazed at the variety of specialty bikes; whatever your budget, you'll find a bike for racing, commuting, touring, or off-road riding" (Kukoda, 1988, p. 58).

The designer expected to see the same population in the project lesson as in the AYH repair courses--all walks of life, and all ages. He deliberately marketed the course to adults,

since these new cyclists would not know about the multi-speed machines that appeared in great numbers in this country only since the early 1970's.

The designer also expected that, given his experience in the AYH repair courses, a majority of the attendees would be women. Many articles about cycling in the late 1980's remarked about the entry of women into the sport; an example was "Women on Wheels" in Women's Sports and Fitness magazine (Weaver, 1987, p. 33). About sixty percent of the target population were women.

There were no further entry skills required than a high school reading ability and some manual dexterity--using a wrench, screwdriver, and tape measure. Since the designer emphasized information objectives, "there sometimes are apparently no required entry skills other than simply the ability to read the materials and use appropriate reasoning skills to reach the instructional goal. Then it is perfectly legitimate to indicate that there are no specific entry behaviors required to begin the instruction" (Dick and Carey, 1985, p. 83).

Organizational Constraints

The designer expected that his project would be part of the AYH curriculum. Since this was no longer possible, he had to find alternate space for teaching the course, or else limit the group size while giving the course in his apartment. He intended for the final session to be given in a classroom at the Lenox Hill Neighborhood Association (LHNA), a settlement house which had a fitness center.

There were organizational constraints about the media to use, since although the designer was then free to choose his own, only Anderson's (1983) recommendations for hands-on training and printed materials would work well in a residential setting. In fact, the designer felt that having smaller groups (six or less) might be an advantage when actual objects were used and students were expected to manipulate them.

Anderson's other suggestion mentioned projected still-visuals, such as slides or film strips, but cost factors and the intent for more hands-on experience ruled out such media.

Instructional Goal

The purpose of this project was to enable students to make an informed decision about purchasing a bicycle which was correctly sized and met their needs. There was a gap between "what should be" (new cyclists who could identify what type of machine they wanted) and "what was." The designer interviewed three New York City bicycle shop owners about their customers, and all three felt that they were hampered by their customers' indecisiveness. "I give what they ask for, but it may not be what they really want. I usually hear about it later when they come back and complain that I steered them wrong," remarked one store owner.

The instructional goal, then, was to give the prospective bicycle owner all the information needed to help the store owner

as well as the buyer. The purchaser could enter a store prepared to confidently discuss frame size, bicycle type, and accessories with shop personnel.

Literature, Existing Course, and Material Review

Related Theory

There are two authors whose work regarding learning capabilities should be noted here.

Bloom (1979) wrote of domains of learning: Cognitive, affective, and psychomotor. This project dealt mainly with the cognitive domain, where one is expected to know, understand, and apply new knowledge--to choose which bicycle purchase would be best. Of the six categories in the cognitive domain, this lesson involved the first three: Knowledge, comprehension, and application. The third category here referred to the ability to use the learned material in new and concrete situations. An example would be when the student went to the shop to make the actual purchase.

Psychomotor skills played a minor role, since the student was expected to wield a wrench, screwdriver, and tape measure. For the fitting segment, the students watched the instructor make the adjustments, and then they were given a chance to perform the tasks themselves. Proficiency in three of the seven categories of the psychomotor domain of Bloom's taxonomy was expected: Perception, set, and guided response. The third category here included imitation and trial and error. The

affective domain was not a factor in this lesson.

Gagne (1987) listed five categories of capabilities: intellectual skills, cognitive strategies, verbal information, motor skills, and attitudes. There is overlap with Bloom's three domains. If we use Gagne's theory, this lesson dealt with verbal information (nomenclature, for example) and intellectual skills, such as the steps for fitting the bicycle to the rider. Motor skills played a minor part, and cognitive strategies and attitudes were not factors in this training.

Literature Review

Techsearch, an information computer search at the New York Institute of Technology, used BRS Information Technologies of McLean, Virginia to produce 3,598 periodical articles for bicycles for 1979-1990. One hundred thirty-nine (139) of those citations dealt with purchase and fitting of bicycles. BRS provided 29 listings after eliminating articles exclusively covering bicycle computers and all-terrain machines. Six of the citations yielded usable background for the designer; others were repetitious, or dealt with exercise (indoor) bicycles, or were specific to localities outside of New York.

The designer located six texts of the "all about bicycles" type. Due to the steady advances in bicycle frame manufacturing and the proliferation of styles, it was difficult to use most books from the 1970's. For instance, all-terrain bicycles dated only from 1978. The designer used these texts to document the research done for fitting the bicycle, and for nomenclature

reference. He used periodicals to give newer information on bicycle types and accessories, which have undergone drastic changes in the past ten years.

1. Ballantine, R. (1987). Richard's new bicycle book. New York: Ballantine.

The author told the new cyclist, in no uncertain terms, to patronize a bicycle shop for best value: "You sometimes save money at a department or discount store, but you are virtually guaranteed headaches and problems [lack of warranty, no spare parts, no experienced mechanic]" (p. 89). The text also covered fitting and accessories in detail, and is an adequate guide for the new cyclist.

2. Braxton, S. (1982). The Bike Stop. Missoula MT: Bikecentennial.

This 42-page guide is a primer for buying and outfitting a touring bicycle. It was produced by an organization that promoted bicycle travel vacations. The author provided several anecdotes that show how most cyclists did not properly understand their machines because they haven't had proper training in nomenclature, fitting, and repair skills. The text is a lively, example-filled guide specifically geared to touring cyclists.

3. Coles, C. and Glenn, H. (1973). Glenn's complete bicycle manual. New York: Crown.

This is an adequate reference for European and old American-made bicycles. Its thrust is basically for maintenance and repair. It did mention that fitting is a result of European

research, especially as regards seat height.

4. De la Rosa, D. and Kolin, M. (1979). The ten-speed bicycle. Emmaus, PA: Rodale Press.

This book described bicycle buying and fitting, and uses of the bicycle for commuting, touring, and racing. It gave a whole chapter on bicycle clothing, so it provided a reference for the student manual: "Properly designed bicycle clothing allows for warmth and ease of movement. Therefore, cycling clothes should be close-fitting. The material should cling comfortably to the rider's body without binding or restricting mobility" (p. 212). It may seem a contradiction that close-fitting clothing still provides ease of movement, but certain fabrics can meet these requirements. The rest of the book is less useful, with several misstatements of fact and poor graphics.

5. Higdon, H. (1988, May). Get into gear! 50 Plus, pp. 36-39.

In this article, the author gave several reasons why older people should consider using a bicycle for fitness, and listed the bicycle types that seniors would find most useful. The report also stated that cycling is less stressful to the body than other fitness activities, such as running. It gave a concise description of the fitting process. It helped the older person who wanted to begin cycling by giving good advice about fitting, nutrition, and benefits of exercise.

6. Kukoda, J. (1988, May). Wheels of fortune. Runners World,

pp. 58-61.

In this article, the author provided runners with a quick overview of their bicycling options, with special emphasis on crosstraining and triathlon uses. He thoroughly reviewed the fitting process and devoted two full pages to accessories that new bicyclists should have. The story showed how bicycling was becoming important to other sports enthusiasts. It is a good source of information for someone already exposed to fitness activities.

7. Kukoda, J. (1989, March). Breaking in a new bike. Bicycling, pp. 71-72.

In this article, the author listed eight problems which owners of new bicycles encounter, and how to have them corrected. Examples were squeaking brakes, gear problems, and mishandling of the fitting. He recommended that new buyers make sure they have a 30-day tuneup included in the purchase price. The article is a useful guide for those who have already made their purchases.

8. Langley, J. (1990, March). One happy customer. Bicycling, pp. 162-163.

In this article, the author listed five major mistakes of first-time bicycle buyers. He cautioned them to make sure they included accessories and checked for warranties and free tuneup commitments by dealers. This account helped those about to purchase a bicycle and gave a checklist so that they could carry it with them to bicycle shops. That small detail was a welcome addition to the article.

9. Martin, S. (1990, April). The ten best cities for cycling (plus a few others you should only drive through). Bicycling, pp. 60-77.

In this article, the author rated cycling-friendly cities by interviewing local cyclists, and noted that New York City was one of the three worst. Reasons he cited were traffic density, problems with theft, and scarcity of parking facilities. Since this course occurred in New York City, instructors would no doubt allude to the unique challenge of cycling there. The article was a useful description of the plans of many urban areas in North America to accommodate cyclists.

10. Redcay, J. (1987, March). 1987 buyers' guide. Bicycling, pp. 37-41.

In this article, the author listed new directions in bicycle frame design and materials. He told new owners what to look for in gearing, weight, and price. He also suggested that they contact both local cyclists and bicycle store personnel to recommend the appropriate machine for their needs. The technical detail may have intimidated the first-time buyer.

11. Schubert, J. (1988). Cycling for fitness. New York: Ballantine.

The author covered a range of cycling topics, including fitting the bicycle to the rider, and various types of machines on the market. Regarding saddle height, he stated, "It feels too low at first. A higher saddle position feels more natural because it's more like walking. It's natural to want your knee

to lock straight with every pedal stroke, as if you were walking, but it's not good for cycling" (p. 72). This text dealt less with bicycle types than how to use the racing or sport touring model.

12. Sloane, E. (1980). All new complete book of bicycling. New York: Simon and Schuster.

The author gave a comprehensive view of the cycling world, including history, bicycle types, safety, touring, and accessories. The text provided confirmation of rules about fitting the bicycle. First, clearance over the top tube by the rider, from a standing position, is necessary so that if the rider is thrown off the seat by a sudden stop, the person is not injured if the feet land on the ground. Secondly, the author cited 1967 experiments at Loughborough University in England where the 109 per cent figure, for seat height, was established. Researchers found that the maximum efficiency in pedaling occurred when the rider's seat was raised to a point where the distance from seat top to pedal axle was 109 per cent of the inseam measurement. The designer has used that formula in the student manual and instructor's guide. "Cycling energy output varied significantly with minor changes in seat height," the text author quoted that university study (p. 85).

13. Weaver, S. (1987, February). Women on wheels. Womens' Sports and Fitness, pp. 33-38.

In this article, the author discussed problems that women beginning to cycle have encountered: Incorrect frame sizing,

uncomfortable seats, and use of technical jargon in stores. She gave average prices for new bicycles and let readers know what to expect upon entering a bicycle shop. The article is an adequate guide for the new cyclist.

14. Zahradnick, F. (1988, March). Shopping the '88 buyer's guide. Bicycling, pp. 60-64.

The author detailed the newest developments in the bicycle market and provided "Five ways to be sure you buy the right bike." Riders must judge their intended cycling style and the local roads and trails before committing themselves to a specific model, he said. This is a good primer for choosing the desired type of bicycle.

15. Zahradnick, F. (1990, March). A vintage year: 1990 buyers' guide. Bicycling, pp. 150-155.

The author discussed "The twelve hottest bikes of 1990," and told readers what to expect in new accessories and frame materials. He also explained about new components for both road and off-road machines. The numerous technical terms may not be as helpful for the new rider.

Survey of Existing Courses and Materials

There were several sources for bicycle repair courses in the New York metropolitan area. The AYH repair and maintenance course dealt with fitting the bicycle in the first session, and courses offered by The Discovery Center, an independent adult education system, and Transportation Alternatives, a cyclists' lobby, touched on the same subject. But there was no course in

the New York City area that was geared to the first-time adult bicycle buyer. All the other courses were for bicycle repair, not bicycle buying and fitting.

Plan for Design and Development Effort

Estimated Student Effort

The estimated student effort was one hour. Approximate times per segment are:

1. Nomenclature--10 minutes.
2. Bicycle types--15 minutes.
3. Fitting--20 minutes.
4. Specialized tools and accessories--15 minutes.

Project Plan

The designer completed the course materials by November 1, 1990. Completion of the implementation phase was scheduled for November 15. The designer constructed PERT and Gantt charts to indicate the timing or activities and their relationships. The charts appear in Appendix C and cover the period August to December of 1990.

Budget

Recurring costs are for instructor salary and duplication of student handouts. The student rate is equal to the instructor rate. Both are $20.00 per hour. Table 2 lists the costs according to the five phases of instructional design.

Table 2

Project Budget

Expense	Designer Hours	Other Hours	Cost	Subtotal	Total
Labor					
Analysis	25	0	$450		
Design	40	0	800		
Development	45	0	900		
Implementation	12	24	720		
Evaluation	20	0	400		
Total Labor				$3,270	
Materials					
Wordprocessing Support			$100		
Student Materials			50		
Total Materials				$150	
Grand Total					$3,420

Summary

The project analysis, regarding the target population's need for a bicycle buying and fitting seminar, has been addressed. The designer defined an instructional goal and reviewed the project in comparison to Bloom's and Gagne's

instructional theories. Since this was not an organization's course, the chapter touches on the unusual constraints that occurred for the implementation phase. The project timeline and budget have been presented.

CHAPTER 3

DESIGN

Introduction

Once the instructional goal has been decided, a course designer can analyze the parts of the lesson to identify the knowledges and skills which the learners will need to perform. Also, identification of entry behaviors can be made.

The designer must then choose the most appropriate media for the lesson, taking cost, time, and availability into consideration. The means to assess and evaluate students' results are listed, and the system for transfer of learning is specified.

Instructional Task Analysis

Once an instructional goal has been chosen, the designer has to determine all the subtasks that learners must perform properly in order to achieve the goal. Dick and Carey (1978, refer to these subtasks as "subordinate skills." They elaborate by referring to Gagne's (1987) categories of capabilities: "The processes used to identify subordinate skills are directly related to various domains of the goals."

Therefore, for instructional analysis, the designer must relate the goal to Gagne's domains of learning, employing a step-by-step breakdown of each goal into subordinate skills so that the learner can progress smoothly from one subtask to the

next until the task is completed. The designer used Dick and Carey's procedural analysis for this project, because the instructional goal must follow a definite path to be meaningful to learners.

Many analyses of subtasks would require flowcharts or diagrams that run for several pages. The designer for this project has placed each subtask in a two-page listing because the learning process was basically linear. That is, each subtask led to the next subtask and did not require combining with another subtask before going on to the next step. Appendix D shows the task analysis for the four parts of the project.

Instructional Objectives

The course objectives were fourfold. They are presented in the form suggested by Mager (1984): Conditions, performance, and criterion.

Mager uses "conditions" to define the "givens" of a situation, the factors that affect how the learner will be able to grasp the material and proceed to finish the task. He uses "performance" to list what the learner does, in an action verb, to complete the task. Finally, he provides a "criterion" to show how well the learner must do to meet the goals of the instruction.

1. Given a graphic showing a bicycle that names the parts, the student will correctly identify the three frame parts labelled "tube."

2. After viewing graphics of both road and all-terrain bicycles, the student will identify three differentiating factors for each of the two major types.

3. Given a bicycle, the student will correctly point out the order of the four adjustment steps necessary to fit the machine to the rider.

4. After viewing a list of tools and accessories specific to cycling, the student will list three accessories and three tools that should be brought for a day bicycle tour.

Based on informal questioning of AYH repair course participants, and a review of cycling magazine articles during the 1980's, the designer broke down the project into four segments: nomenclature; types; fitting; plus tools and accessories.

The four objectives were consistent with the overall intention of the course: To provide learners with adequate information to buy an appropriate bicycle. The first objective recognized that students will not grasp all the terms for parts of the bicycle immediately, but emphasized the naming of frame tubes that figure in the fitting segment.

Entry Behaviors Defined

Learners for this project were expected to be high school graduates, because they needed to peruse cycling periodicals and follow a student manual. Students were drawn from the general population and had selected themselves. Because most adults in

the New York City area are high school graduates, the designer did not expect any learners to have reading problems with the class materials.

One assumption was that the group display minimal manual dexterity, such as using screwdrivers and wrenches. The fitting segment required wielding a wrench during the adjustment of seat height and seat fore-and-aft position. The learners also had to use a tape measure to help in fitting the machine and deducing the bicycle's dimensions.

Group and Sequence Objectives

In order to to clarify the "fuzzy goal" of "informing the bicycle buyer before the purchase," the designer reviewed the four latest annual issues of Bicycling magazine's Buyers Guide, from 1987 to 1990, and found that all four had articles about types of bicycles on the market. That topic became the most important that any "buying and fitting" course would contain. The first question most new cyclists had was, "Which model is right for me?" Then they asked, "How does this fit so I'm comfortable?" Three of the buyers guides discussed sizing the bicycle to the rider, so that topic became second in importance.

Three magazine issues dealt with names of parts, and that became third priority for the course. Actually, it would have been difficult to complete the first two parts without detailing the nomenclature first, so it became the first topic of instruction. The designer had to consider that the most

important segment of instruction need not be the first presented, because the learners might need prerequisite skills to better grasp the later segments. Here, the prerequisite skill was nomenclature of the bicycle parts.

Only one of the four buyers guides talked about tools and accessories, but the designer encountered plenty of questions about them when he was teaching the AYH repair courses. Those sessions did not cover accessories, so the designer felt that any discussion of them detracted from the topic at hand--bicycle repairing. He felt that the proper place to deal with the subject was in a buying and fitting course, since new cyclists were apt to have many questions about accessories.

As for the sequencing of objectives, both "types on the market" and "fitting to the rider" would have to wait until learners could properly identify the parts. The designer and other AYH repair course instructors noted that often the students would point to a part on the bicycle but did not know the proper name. Therefore, nomenclature became the first segment of the course, even if it was a rote exercise. The segment was livened during the delivery by a quick "show and tell" session that the instructor provided.

The segment on bicycle types was placed next, because this was the topic of most concern to learners. Fitting came third, since its importance for new cyclists was a close second to the previous segment, and it built on the knowledge that students gained in the first two segments.

The lesson on tools, clothing, and accessories was placed last, because people would need to have the information about their bicycles already before they decided what should come with their purchase.

Learning Activities Specification

The designer prepared a matrix to define the learning activities and instructional methods, which is presented in Table 3. Once the lesson's parts were defined, grouped and sequenced, the designer was able to structure the course so that the best instructional methods became apparent.

Table 3

Learning Activity Instructional Strategy Matrix

Learning Activity	Content	Instructional Method	Media
1.	Nomenclature	lecture	realia, handout
2.	Types of Bicycles	lecture	realia, handout
3.	Fitting Bicycle to Rider	demonstration, drill and practice	realia, handout
4.	Accessories, Tools, Clothing	lecture	realia, handout

Instructional theory attempts to ensure that learning is retained. Gagne, in "The Conditions of Learning" (1987), lists nine events which designers need to consider to help retention. The designer chose actions for the instructor's use which would further this goal.

1. Reception: Gaining attention. The instructor placed the bicycle before the students, and picked up tools and accessories to give visual stimulus.

2. Expectancy: Informing learners of the objectives. Students received the manual (handout), and the instructor paged through it with them, pointing out the information it contained. Objectives were listed at the beginning of each segment.

3. Retrieval to working memory: Stimulating recall of prior learning. The instructor questioned the students about their reasons for taking the course, and mentioned that many cycled as children. Also, objects familiar to most (for example, screwdrivers and wrenches) were described as articles they needed to properly outfit their bicycles.

4. Selective Perception: Presenting the stimulus. Since the learning outcome was primarily verbal information, the instructor pointed out each of the objects in the lesson, including the handout, and gave a description of each process--for example, adjusting the bicycle to fit the rider.

5. Semantic encoding: Providing "learning guidance." This was used only for the nomenclature segment; the instructor

showed how major frame parts are all "tubes".

6. Responding: Eliciting performance. Learners would demonstrate the "fitting" segment after the instructor showed the process. They were also asked to name parts of the bicycle throughout the last three segments to check on retention of the nomenclature segment.

7. Reinforcement: Providing feedback. At the end of each segment, the instructor summarized the main points. Throughout the lesson, students heard feedback (e.g. "Good", "That's not quite right") to their answers when the instructor questioned them.

8. Retrieval and Reinforcement: Assessing performance. Post test was delivered immediately following the session.

9. Retrieval and Generalization: Enhancing retention and transfer. The instructor pointed out the usefulness of the handout, especially since the students are not expected to name all of the bicycle parts, accessories, and tools by the close of the session. Also, the students were encouraged to network among themselves following the class so they could learn from each other's progress.

Assessment System Specification

Because this project gave only new verbal information to the learners, the designer decided not to include a pretest. The results would no doubt show that most students had little background in the subject before the session. A post test was

planned for learners immediately after the training.

Evaluation System Specification

The planned formative evaluation consisted of one-on-one, small group, and field trial sessions with uncoached learners. The instructor intended to observe body language and to note carefully what questions these students asked. The instructor was also to solicit comments on the course.

Following the individual trials, the designer planned a small-group meeting. The intent was to get further reaction to the course before its field-trial presentation. During all these trials, adjustments were to be made to the instructional materials.

The designer intended that the summative evaluation process consist of a comparison between the post test responses of the final "implementation" group of learners, and a control group which had not had the instruction. A control group of ten was formed.

Learning Transfer System Specification

The designer intended that learners come away from the lesson with a student manual that summarized the four segments of the lesson, and provided a graphic of two bicycles to help with the nomenclature recall. He felt that the naming of minor parts and listing of tools and accessories would take time to learn.

Broad (1982) listed actions that organizations can take to

support transfer of training before, during, and after a course is completed. This project was not part of an organizational program, but there were still relevant actions which Broad listed that would help learners after the instruction.

The major point, in the designer's opinion, was that the students form support groups to meet or call each other during the weeks after the course. They could then compare notes on their progress toward the final goal: Purchase of a bicycle. Another idea from Broad was finding a mentor for support. Those who were already in a bicycle club could find an experienced member to help them with the choice of model. The instructor could also offer to be mentor for the group members.

Broad also suggested that the instructor cite examples of successful transfer of learning. The designer intended to show learners copies of several cycling magazines and suggest that they subscribe to one. In the magazines, they would find articles by "celebrity" cyclists about bicycle types, fitting to riders, and successful races or tours.

Review and Selection of Existing Materials

No materials identified in the analysis phase were deemed suitable for use in the design of this project.

Summary

The designer completed an instructional task analysis which linked the course segments to the behaviors identified in

the analysis phase. He listed the four instructional objectives, defined the entry behaviors, and sequenced the four lesson segments. Media for instruction were chosen, and the lesson was explained in terms of Gagne's (1985) nine steps of instruction. Finally, the designer provided the specifications for assessment, evaluation, and learning transfer.

CHAPTER 4

DEVELOPMENT

Introduction

In this chapter, the designer shows how the lesson took final shape. The media selection process, according to Anderson (1983), is detailed. Background to the learning activity review is provided by describing the verification by subject matter experts. Finally, the designer produced the materials for use in the course, including the instructor guide, student manual, and post test.

Learning Activity Development Scheme

This project had four segments, but they were related to each other and built upon each other. One could argue that the final segment on tools, accessories, and clothing was not necessary, and the other three segments could exist without it. However, students in the AYH repair courses had shown a high degree of interest in the three topics listed for the final segment, and the other subject matter experts insisted that the segment remain in the course.

This single instructional module, slated to last one hour, was constructed so that students would gain some information just from the handout. The instructor's presentation would serve to reinforce the lesson by employing the principles of Gagne's nine conditions of learning. Feedback would occur as the

students asked questions, the instructor asked questions of them, and as the students completed the post test.

Learning Activity Development

As for media choices for the project, the designer relied mainly on "Selecting and Developing Media for Instruction" (Anderson, 1983). But even here, there was empirical evidence that confirmed the choices which Anderson would provide.

The bulk of reference materials for the project were articles in magazines, plus some notes from the AYH bicycle repair courses, where 20 years' teaching experience was invested. It should be noted that the repair courses at one time relied on film strips that had originally been prepared in 1977 for a New York City Public Schools project in bicycle safety. They were eliminated from the curriculum when students requested more time to practice with the demonstration bicycles. For this project, it was the designer's intent that the class members actually see and work with the machines of the types that they would be purchasing.

Some forms of tutorials lend themselves to computerization; that is, a disk-based course was a possibility. It would be time-consuming but entirely feasible to present this course by preparing it with an authoring system. However, users would not have real bicycles, tools, or accessories to work with, and the many graphics that would have to be created would defeat the intent of time-effectiveness.

Motion visuals might be effective if this were a "safe riding" course, or if there was a "test ride" afterwards. But the intent here was to give information on four topics, and there was no suitable location nearby for an outdoor segment.

A review of the Media Selection Process (Anderson, 1983) showed that the designer should use an instructional aid to support an instructor-led presentation. The project consisted of instruction that need not be exactly reproducible, was not intended to be self-paced, nor was face-to-face communication impractical (Anderson, 1983, p. 19). Cognitive rules were involved, with interpersonal skills and displays of sound and motion unnecessary, for objects that were somewhat familiar to the students (Anderson, p. 29).

In this case, Anderson would use what he referred to as "Class II, IV, and VIII" of his media classifications: Printed materials, projected still-visuals, and physical objects. The designer, mindful of cost implications, could only use the handout (a student manual) and physical objects (bicycles, tools, and accessories) to get the lesson's points across. The consideration here was that the course might take place in an apartment, or in a classroom that might not have the audio-visual equipment.

The student manual handout consisted of five pages, with an introduction, four parts, and a conclusion. A copy appears in Appendix E. One page consisted of a graphic of both a road bicycle and an all-terrain bicycle.

The instructor's guide was four pages long, and gave introductory cautions. There were four parts corresponding to the segments of the lesson, and one graphic of the links between road and all-terrain bicycles suitable for reproduction on a chalkboard or flipchart. The guide is reproduced as Appendix F.

The post test consisted of six questions related to the four segments of instruction and it appears in Appendix G. It included fill-in questions, a true-false choice, and a numerical order fill-in. The designer reviewed these questions with both subject-matter experts to verify that they accurately represented the knowledge the course was intended to convey.

Learning Activity Review

The designer completed a review of the instructional materials to ensure that they formed a complete product responsive to the design. He reviewed it with two subject matter experts. One was another bicycle repair course instructor, and the other was an owner of a bicycle tour company.

The subject matter experts verified that the content was technically accurate. They suggested the inclusion of bicycle clothing as part of the fourth segment, since the designer had only listed tools and accessories in that part. He became convinced that the specialized bicycle clothing on the market was a worthy topic for discussion in a course for beginners. The subject matter experts also confirmed the accuracy and

appropriateness of the grammar, style, and punctuation of the learning activities.

Materials for Evaluation Produced

The designer readied only two sets of student handouts for the small group instructional meetings, because there was always a possibility that the initial sessions would give results that meant revision of the materials. The manuals were produced in the format which the designer intended for the final presentations. The same method was used for the post test and the instructor manual. The designer used a wordprocessing system for ease of revision and found that a near-letter-quality setting for the printer gave adequate results for all materials.

Summary

The designer employed a media selection process to decide which forms would help the presentation the most. He determined that an instructor-led presentation with student handouts and physical objects would serve the purpose best. Although he considered himself a subject matter expert, he submitted the materials for review by two other experts. They provided valuable advice that led to revision of the handout. All three subject matter experts, including the designer, verified the accuracy and appropriateness of the materials in terms of grammar and style.

CHAPTER 5

IMPLEMENTATION

Introduction

This chapter describes the process of preparing the final materials and proceeding to administer the implementation phase. It details the peculiar constraints which the designer encountered with a project that was not workplace-based. It tells how he gathered subjects for the project from a variety of sources. Finally, it details the data collection process.

Materials for Implementation Reproduced

Once the formative evaluation was completed and appropriate changes were made to the instructional materials, the designer assembled six copies of the student manual and the post test in "market-ready" form. He also produced a final version of the instructor's guide.

Instructional Delivery

Since this project was an "extracurricular" course, not originating in the workplace, the designer had to recruit participants. He did not have a captive audience. Those who did take the course were interested in the subject. They were recruited from the general population, but had the requisite entry level skills--high school education and minimal motor skills.

The designer advertised for the course in two cycling publications, the New York Cycle Club monthly bulletin and the Breakaway Vacations brochure. The latter is a cycling and hiking tour company based in New York City. The designer found another source of students in two dance organizations, and recruited several people who joined two day hikes he led for AYH in October and November of 1990. In all cases, he screened out those who already owned bicycles so that the audience would be unlikely to have prior knowledge of the subject.

One attempt to take the courses outside of the designer's living quarters had disappointing results. He had contacted the Lenox Hill Neighborhood Association, which conducts fitness seminars, in order to schedule a project course for its members. He produced flyers and arranged to use a classroom at LHNA, but there was no response for the scheduled date, November 1. He had intended to use this group for the final implementation, but then had to find others to participate in that presentation. The LHNA representative and the designer agreed that the course would generate less interest in November than in the spring. In fact, they did arrange for the designer to present the course at LHNA in April 1991.

The designer then scheduled two sessions of three persons each in his apartment for early November 1990. These six people represented the sample for the implementation stage. He would have preferred a larger sample, and had hoped for at least ten respondents to the LHNA seminar. A larger sample would have

provided better results for the evaluation phase because a smaller group is suspect on statistical grounds.

The six students asked a number of questions unrelated to "buying and fitting" during the course, especially regarding bicycle repair options. The instructor handled those questions at both sessions, and managed to complete the four segments of the lesson within one hour, as planned. After the lesson was concluded, and the post test was completed, he fielded questions on general topics of cycling componentry and safety for about 20 minutes. He had expected to do so, and had mentioned this possibility in the instructor's guide. During the lesson, the instructor followed Gagne's (1975) nine actions to enhance retention as mentioned in the instructor's guide. For example, he would ask a student to name a bicycle part during the final three segments, to emphasize the learning which had occurred in the first segment on nomenclature. He made several suggestions according to Broad (1982) to transfer learning after the course. Specifically, he told the participants to exchange telephone numbers, so they could network with each other during their search for new bicycles. He told them he would be available by telephone to answer any questions they would have in the coming weeks. Finally, he passed around copies of different cycling magazines and suggested that they subscribe to any one for the latest information about trends in the sport.

Data Collection

After each session, the designer provided the post test to each student. He ensured that the participants understood the purpose of the post test by discussing each item before allowing the group to proceed with their answers. He collected the post tests and marked them.

Summary

The project's implementation stage took place during November 1990. The designer taught all sessions. Even though an effort to involve the Lenox Hill Neighborhood Association in the project failed for lack of attendance, there was still enough enthusiasm for the topic to draw six people to complete the course. The time of year was a factor, because cold weather was first appearing. The designer realized that this course would draw a larger audience in the spring, when many people first think of outdoor activity after winter. All participants completed the post test.

CHAPTER 6

EVALUATION

Introduction

The designer instructed for all classes, which began in October 1990 with one small-group session of three persons. Attempts to schedule one-on-one training failed due to scheduling conflicts and the difficulty of recruiting individuals. A pilot test for six persons followed, and then two three-person "final implementation" sessions. All courses were completed in six weeks. All were held in the designer's apartment.

For a control group, the designer enlisted nine persons who were not bicycle owners and who expressed no interest in the course. The designer compared their responses to the post test with those of the implementation group by tabulating the results for each question and then establishing the mean, variance, and standard deviation for each group. According to Phillips (1987), statistics used for evaluation can summarize large amounts of information, and can help to compare differences in performance between two groups.

This project dealt with the first two of the four levels of summative evaluation described by Kirkpatrick (1976). It also featured several methods of learning transfer upon completion of the lesson (Broad, 1982). Although total mastery of the subject matter was not present in the post test results, the designer felt that the scores were close enough to that goal to justify

continuation of the course.

Formative Evaluation

The designer used several preparatory sessions of instruction to strengthen the course. In this way, he could be assured the the training materials were properly arranged to promote the objectives of the course. He had to revise the materials when he found any part which hindered the learners' ability to absorb the instruction.

Gagne and Briggs (1974) have described the three phases of proper formative evaluation: One-on-one trials, small group trials, and pilot tests or field trials. According to Dick and Carey (1985) formative evaluation is used to improve the effectiveness of the instruction.

One-on-One Trials

Attempts to schedule one-on-one training failed due to scheduling conflicts and the difficulty of recruiting individuals for the course. The instructor had to compensate by doing a telephone followup with the three small-group participants, in which he asked general questions about their reaction to the course.

If one-on-one trials had been feasible, the instructor would have monitored the response of each student as the lesson was presented. The learners would have been encouraged to tell the instructor when there was anything unclear in the presentation. In practice, the instructor used this method during the small group session instead.

Small Group Trial

Normally, the small-group trial refines the program after the one-on-one sessions while increasing the number of learners. It allows the designer to see if changes made after the one-on-one meetings were effective and may pinpoint additional problem areas.

In this instance, the small group was the first session, so the instructor had to observe the three participants and in some ways treat them as if they were in a one-on-one situation. He then performed a telephone follow-up for any delayed reactions to the training. The group said they appreciated the effort in general. They mentioned that they felt the last segment on tools, accessories, and clothing was not that important. The designer had debated this point with the two other subject matter experts. He decided that it was his lack of emphasis that caused their reaction, and that he had to revise the instructor's guide so that proper emphasis was given to the segment. He considered it important enough to retain.

The three students were given the post test at the close of the training. They were adults who claimed that they had not cycled since childhood and had never ridden modern multi-speed bicycles. Their results indicated that the designer had to reword the fourth item, a chronological-order question regarding the steps to fit a bicycle to the rider. The session had given more importance to the problem of a too-long stem at the handlebars, a potential source of overstretching and back pain.

Two of the learners put that item in a higher priority than the fore-and-aft adjustment of the seat, which really preceded stem length in the adjustment scheme. The designer revised the item on the post test. He also changed the emphasis in the instructor's guide.

The group post test results are described in Table 4. The results showed that the learners had grasped most of the objectives, but the small sample precluded any definite conclusions except for revising the fourth item.

Table 4

Small Group Post Test Results

n = 3

Student	Question						Score
	1	2	3	4	5	6	
A	Y	Y	Y	Y	Y	X	83
B	Y	Y	Y	X	Y	Y	83
C	Y	Y	Y	X	X	Y	67

Mean: 78.0

Y = Correct, X = Incorrect

The post test had been created with six items corresponding to the four course objectives. The items were not presented in the same order as the instruction because the designer wanted

to mix the types of questions and also lead off with a strong indicator of how much the class absorbed. The first question, a fill-in, covered a major point of the whole instruction: The initial step in fitting the bicycle to rider. It was actually derived from the third segment of the training.

The first and fourth questions were related to the third objective, fitting the bicycle. Question 2, a true/false option, represented the second objective: Types of bicycles. Nomenclature, the first objective, was covered by Question 3. Finally, the last two questions, which were multiple fill-ins, dealt with the fourth objective and gave students a chance to show that they knew the difference between a tool and an accessory.

Pilot Test (Field Trial)

Six persons attended the pilot test or field trial. They scored better on the post test than the small group, especially on the revised fourth question. Their responses are listed in Table 5. However, several stumbled on Question 5, which asked for a listing of tools for a day ride. This occurred despite the instructor's new emphasis on this topic. He concluded that this group could not properly discriminate between a tool and an accessory, since all six learners did name a sufficient number of accessories in Question 6. Another conclusion was that the difference in some cases amounted to mere semantics, and maybe it was not necessary to make the distinction. For instance, an air pump might be regarded by some as a tool, and by others as an

accessory.

Table 5

Pilot Test Post Test Results

n = 6

Student	Question						Score
	1	2	3	4	5	6	
A	Y	X	Y	Y	Y	Y	83
B	Y	Y	Y	X	X	Y	67
C	Y	Y	Y	Y	Y	Y	100
D	Y	Y	X	Y	Y	Y	83
E	Y	Y	Y	Y	X	Y	83
F	Y	Y	Y	Y	Y	Y	100

Mean: 86.1 Variance: 130.0 Standard deviation: 11.4

Y = Correct, X = Incorrect

Summative Evaluation

Kirkpatrick (1976) describes four levels of summative evaluation. This project covered the first two.

Reaction

Rather than prepare a formal questionnaire for a reaction study, the designer solicited comments from participants about how they felt about the course. No one had a negative response,

a phenomenon which no doubt occurred because all had freely chosen to participate. In order to further quantify learner reaction, the designer then asked five questions right after the lesson or by telephone several days later. The results, in Table 6, show that students had a very favorable impression of the instruction.

Table 6

Learner Reaction Survey

n = 6

Reaction question	Yes	No
1. Course met your needs	6	0
2. Materials distributed were useful	6	0
3. Instructor was prepared	6	0
4. Too much lecture?	2	4
5. Were all four segments useful?	6	0

Regarding the fourth question, two of the learners explained that more handouts and graphics would have helped the presentation. No one in the formative stages had previously raised that point. All were appreciative of the handout and the chance to see all the tools and accessories of the fourth segment. All remarked that the information provided by the instructor would definitely help in their decision about a bicycle purchase, which was the designer's main goal.

Learning

Six persons attended the course for the implementation stage, three each in two sessions. Their post test results are summarized in Table 7. The mean score was slightly lower than for the pilot test group, but no one question stood out as a problem. Two erred on the true/false item about bicycle types, but perhaps that was due to inattentiveness. All six participants had stated that they were mainly interested in road bicycles, so they may have discounted this segment.

Table 7

Implementation Post Test Results

n = 6

Student	Question						Score
	1	2	3	4	5	6	
A	Y	X	Y	X	Y	Y	67
B	Y	Y	X	Y	Y	Y	83
C	Y	Y	Y	Y	Y	Y	100
D	Y	Y	Y	Y	X	Y	83
E	Y	Y	X	Y	Y	Y	83
F	Y	X	Y	Y	Y	Y	83

Mean: 83.0 Variance: 90.8 Standard deviation: 9.5

Y = Correct, X = Incorrect

Nine persons had volunteered to act as a control group for the project. Their responses confirmed the designer's suspicions that it would be difficult to find people who were completely unaware of bicycle terms and usage. Their post test results are summarized in Table 8.

Table 8

Control Group Post Test Results

n = 9

Student	Question						Score
	1	2	3	4	5	6	
A	X	X	X	Y	Y	Y	50
B	Y	Y	X	X	X	X	33
C	X	Y	X	X	X	X	16
D	X	Y	X	Y	X	X	33
E	X	Y	X	X	X	X	16
F	Y	X	Y	X	Y	X	50
G	Y	X	X	X	Y	Y	50
H	X	Y	X	X	Y	Y	50
I	X	Y	X	X	Y	Y	50

Mean: 39.0 Variance: 192.8 Standard deviation: 13.9

Y = Correct, X = Incorrect

The mean score for the control group was 39, and that

compares with 86 for the pilot test and 83 for the implementation stage. Also, the high standard deviation showed that what knowledge this group did possess was scattered among the topics. It was not focused the way the learners' responses had been. The designer concluded that much of the 40-point difference was due to the training effect. He further concluded that the project had justified itself, and could be the basis for continuation of the course.

The designer prepared a post test to measure how much students had retained after the one-hour session. Table 7 gave the test results for the six questions. The designer revised it into Table 9, which only lists objectives, so one could see which were met. He determined that an objective was met only if all the questions related to that objective were correctly answered.

Analysis of Table 9 shows that none of the four objectives was achieved by all participants, but the designer was not allowing half scores for the objectives that had two questions. It should be noted that one participant had a perfect score and the lowest test score for any participant was 67 per cent, and three-quarters of the objectives were met.

Behavior

The designer recognized that the post test was an imperfect instrument for judging the learners' readiness to purchase a bicycle. He used the post test to measure how much information they had absorbed during the one-hour course, emphasizing points

Table 9

Implementation Post Test Results for Objectives

n = 6

Y = Objective Met					Per cent of objectives
Student	Objective				passed by each learner
	1	2	3	4	
A	Y			Y	50
B		Y	Y	Y	75
C	Y	Y	Y	Y	100
D	Y	Y	Y		75
E		Y	Y	Y	75
F	Y		Y	Y	75
Mean	67	67	83	83	Y=75

they would have to use when they decided on their purchase.

The action that the designer was preparing the students for would likely take place weeks after the class. Therefore, that part was up to the student, and outside the scope of this project. If behavior was to be measured, the designer would include a followup mechanism, such as a group meeting or telephone survey to discuss students' progress toward an actual purchase. The mechanism would detail what the students had bought and whether they had received a proper fit. They would be specifically asked whether they had used the information they

had learned.

Results/Impact

Since this was a one-hour course with no followup, this fourth step of evaluation (Kirkpatrick, 1987) was outside the scope of this project. A recreationally oriented course such as this one is not a strong candidate for showing a "return on investment" type of result.

Learning Transfer

Broad (1982) described learning transfer as actions by trainers which enhance retention of learning after the training is over. Her point was that we should invest more energy in developing visible management support for training back on the job. In this project, there is no "management" to support whatever the learners do after the course. Broad goes on to provide many possible actions that trainers and trainees can take, even without management, to help transfer the learning.

The designer used two of these actions in the instructor's guide. The first was networking: Students were encouraged to trade telephone numbers and keep in contact with each other about the process of bicycle purchasing. That way they could compare notes on shops and brands, and help each other decide on a purchase. The other recommendation was that each learner find a mentor who was an experienced bicyclist. This person would be willing to guide the prospective rider toward the goal of owning a bicycle. According to the guide, the instructor should be

willing to assume this responsibility.

Summary

In this chapter the designer presented the results of the formative and summative evaluations of the project. He related how the small group trial had to substitute for the one-on-one sessions, and how the pilot test was conducted. He listed changes to the training which resulted from the formative evaluation. Charts were provided to detail the post test results for each training session and the control group.

The designer also showed how he followed the first two steps of Kirkpatrick's (1976) summative evaluation and why the last two were not feasible. Finally, he showed how he used several items to enhance learning transfer even though there was, in this training, no return to the workplace.

CHAPTER 7

SUMMARY AND RECOMMENDATIONS

Introduction

This final chapter reviews the process of constructing and delivering the training proposed by the designer. It provides the designer's conclusions and recommendations based on what actually transpired, since several of the designer's plans were not realized.

Methods and Procedures Used

Analysis

The designer used the instructional systems design (ISD) process to analyze the need for a training course on buying and fitting a bicycle. He used questionnaires and interviews with cyclists and shop owners to show that a training course was a likely vehicle for learning the subject. This occurred after he had identified a gap between what people who purchased bicycles knew and what they should have known. He also conducted a literature search for background material.

Design

The designer listed four objectives which would help learners make their decision on which bicycle type and size to purchase. He knew the course would draw the general population as students, so he had little trouble defining the entry behaviors. He employed a media selection process, with Anderson

(1983) as a prime reference.

Development

The designer assembled a student manual, instructor guide, and post test for the course. He decided on a lecture format although the class members would participate in one segment, on fitting the bicycle to the rider. He reviewed the materials he had prepared with two other subject matter experts and made changes according to their suggestions.

Implementation

Implementation did not proceed smoothly. The designer ended with fewer participants than he wanted. First, American Youth Hostels ended its local programming, depriving the designer of an expected audience. Another attempt to draw a crowd, at the Lenox Hill Neighborhood Association, failed due to poor timing. The designer marketed the course in several publications, and drew enough students to make conclusions about its usefulness. He had to give all course sessions in his apartment. That may have been an advantage, since the smaller groups provided an good atmosphere for interaction with the students.

Evaluation

The formative evaluation consisted of two sessions: A small group and a pilot test. The designer had to forgo one-on-one sessions due to lack of volunteers. He questioned the small group participants afterwards in a way that made up for the missing one-on-one training. All students completed a post test, and the changes the designer made to the package after the first

session helped produce an improvement in the scores of the pilot test group.

For the summative evaluation, the designer taught six learners. He was able to show that the project consisted of the first two of Kirkpatrick's (1987) four levels of evaluation: Reaction and learning. The students completed the post test along with nine others in a control group. Evaluation of the test scores showed that the course was a justifiable project.

Conclusions

The designer reviewed the post test results for the pilot test and the implementation stage. He concluded that the project had definitely prepared the learners for the task of buying a correctly fitted bicycle. He came to that conclusion by comparing the pilot test and implementation stage results to the control group. The post test results for the learners showed a 40-plus improvement in scores over the control group. One could argue that the difference could be attributed to factors other than training. However, it would be hard to state that premise when two separate learner groups achieved roughly the same mean.

The designer concluded that the course was a viable effort which might even earn money. Several students said they would pay for a similar course, and three different New York City concerns have offered bicycle repair training for a fee. This topic was not much different from those courses. The designer already arranged to give the training at a settlement house in

New York's East Side in April 1991.

Another conclusion was that demand for such a course would be seasonal. Although the designer found enough persons to take the training, he was aware that there would be many more subjects in the spring of any particular year than in autumn. Anyone seeking to earn money by teaching about buying and fitting bicycles should be prepared to do the bulk of the instruction from March to July.

Recommendations

1. Since the bicycle market is basically homogeneous throughout North America, this project course could be given anywhere. It is not subject to restraints of locality, except that instructors in urban areas may emphasize using "city" all-terrain bicycles if the local roads are poorly maintained.

2. This course is best conducted for ten persons or less, although there should be at least five to make the effort worthwhile. This provides enough intimacy and time for the instructor to respond to the many questions students will ask. The training should be conducted in a classroom with enough open space for students to examine and work on two bicycles. The machines would be one road and one all-terrain bicycle. The classroom should be equipped with a chalkboard or flip chart.

3. Instructors should have bicycle repair experience, since inevitably learners will ask questions of that nature.

Concluding Statement

I have been gratified by the response of those who participated in this project. I realized that since I offered the course for free, many people would feel they had nothing to lose. But the partial success of populating the classes, even as temperatures plummeted in October and November, meant that the subject was important for some even then. I would expect many more participants in the spring and summer.

Bicycling is one of the best combinations of human and machine. I would be gratified to know that completion of this project caused more people to take up the sport confidently.

APPENDIX A

BICYCLE BUYING QUESTIONNAIRE

BICYCLE BUYING QUESTIONNAIRE

1. How many years have you had your present bicycle? _____

2. Did you get a proper fitting at the shop when you bought it?
   Yes _____ No _____.

3. Do you feel satisfied with the service from the shop, both when you bought the bicycle and at any later time you dealt with the shop?

Very satisfied____.
Somewhat satisfied_____.
Dissatisfied_____.

APPENDIX B

JOB TASK ANALYSIS

JOB TASK ANALYSIS FOR BUYING AND FITTING A BICYCLE

The end desired result is that the bicycle buyer feels comfortable with the purchase made. We have to analyze how that comes about.

1. Correct fit.
   Purchaser has found the right frame size, the correct seat height, and a comfortable reach to the handlebars while seated on the bicycle.

2. Correct type of bicycle.
   Purchaser has found right frame and components (parts) for the type of intended riding, whether it is on well-paved roads, poorly-paved streets, or dirt trails such as fire roads; and whether the cyclist intends to do fast riding for entrance into a racing career, use the bicycle for commuting, or add accessories for touring vacations.

3. Correct choice of other bicycle equipment.
   Purchaser has found the right tools, accessories, and clothing to match the style of intended riding, and can choose the proper equipment for a day tour.

APPENDIX C

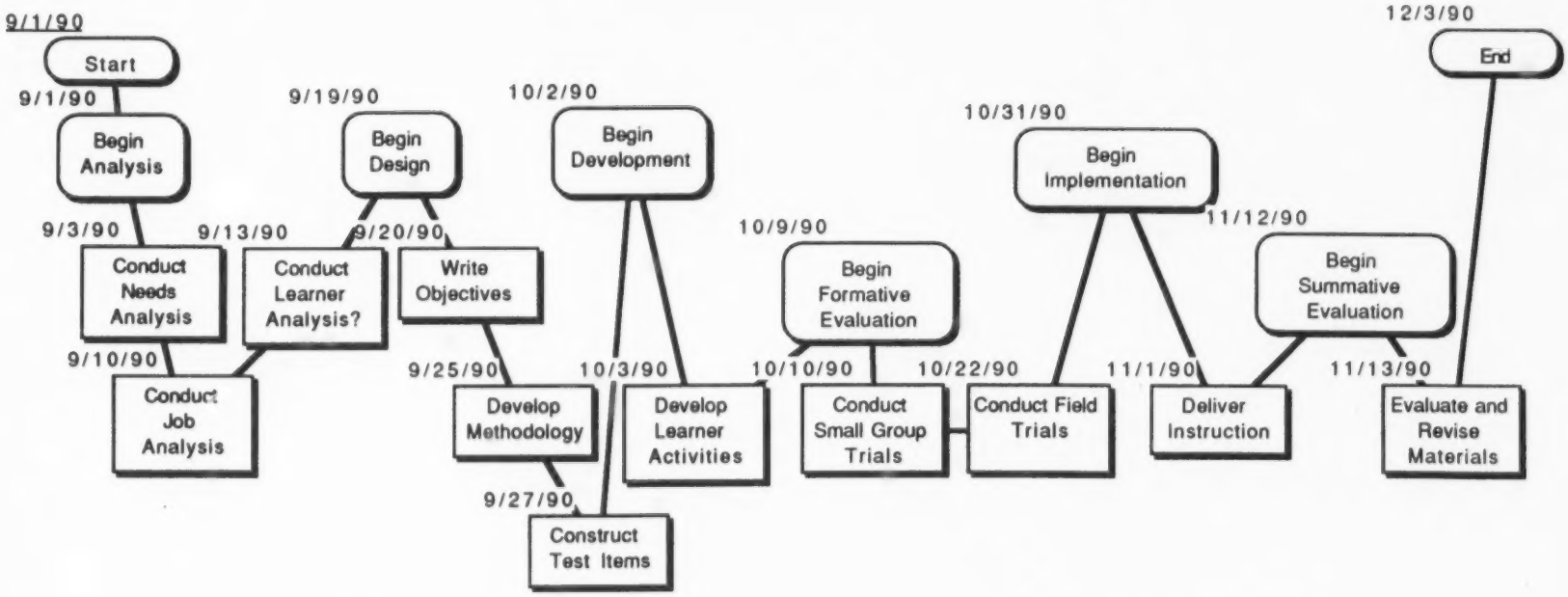
PROJECT PLANNING

PROJECT PLAN for Buying and Fitting a Bicycle Seminar

	Weeks	Start	Finish
1. Needs Analysis	1 1/2	9/1/90	9/10/90
2. Job Analysis	1/2	9/11/90	9/13/90
3. Instructional Analysis	1	9/13/90	9/19/90
4. Write Objectives	1/2	9/20/90	9/25/90
5. Develop Methodology	1/2	9/25/90	9/27/90
6. Construct Test Items	1	9/27/90	10/2/90
7. Develop Learner Activities	1	10/3/90	10/9/90
8. Small Group Class	2	10/10/90	10/22/90
9. Pilot Test	1	10/22/90	10/31/90
10. Deliver Instruction	1 1/2	11/1/90	11/11/90
11. Evaluation	3	11/12/90	12/3/90

PERT Chart

Bicycle Buying and Fitting Seminar
Development Plan



W. Schwarz
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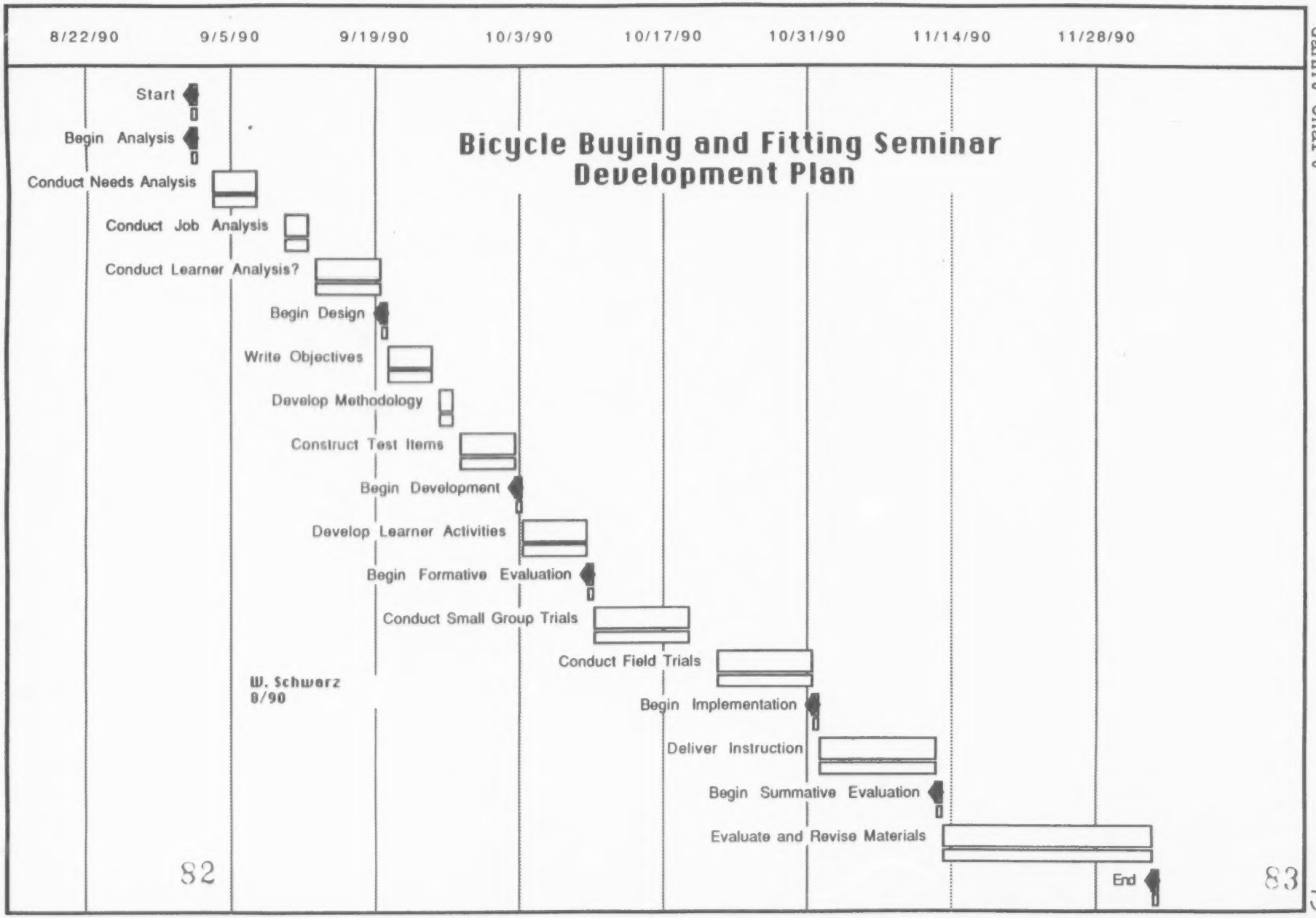
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9/5/90
9/19/90
10/3/90
10/17/90
10/31/90
11/14/90
11/28/90
Bicycle Buying and Fitting Seminar
Development Plan
Start
Begin Analysis
Conduct Needs Analysis
Conduct Job Analysis
Conduct Learner Analysis?
Begin Design
Write Objectives
Develop Methodology
Construct Test Items
Begin Development
Develop Learner Activities
Begin Formative Evaluation
Conduct Small Group Trials
Conduct Field Trials
Begin Implementation
Deliver Instruction
Begin Summative Evaluation
Evaluate and Revise Materials
End
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83

APPENDIX D

INSTRUCTIONAL TASK ANALYSIS

INSTRUCTIONAL TASK ANALYSIS FOR BICYCLE BUYING AND FITTING

TASK	STEP
1. Naming parts (Verbal Information)	a. Naming <u>frame</u> parts, including those with "tube" as part of the term. b. Naming other parts which affect fit, e.g. seat post, seat, handlebar stem. c. Naming other parts which do not affect fit, e.g. brakes, gears, wheel components.
2. Differentiating among bicycle types (Intellectual Skills)	a. Noting tire/wheel differences. b. Noting handlebar differences. c. Noting frame dimension differences. d. Noting different brake systems. e. Noting different fitting requirements.
3. Fitting bicycle to rider (Intellectual and Psychomotor Skills)	a. Frame size. 1. Straddling top tube of bicycle with both feet on ground; observing clearance between tube and crotch. 2. Measuring bicycle from bottom bracket to top of seat tube, using tape measure. b. Seat height. 1. Measuring person's inseam. 2. Taking 109 per cent of that figure. 3. Applying the new figure from (2) to the distance from pedal to top of seat. 4. Adjusting seat height by: a. Determining type of tool needed for seat post--screwdriver, hex wrench, or regular wrench. b. Applying correct tool to loosen nut. c. Adjusting height of seat to new measurement. d. Retightening nut. 5. Ensuring that rider does not lock knees at this new seat height.

c. Seat fore and aft.
   1. Sighting that seat post bisects seat.
   2. Loosening seat from seat post by using correct wrench on bolts.
   3. Sliding seat forward or backward on seat rails until seat is half in front, half behind seat post.
   4. Tightening bolts with wrench.

d. Stem length.
   1. Checking distance from seat nose to handlebar, which should equal length of forearm.
   2. Ordering replacement stem if fingers do not reach handlebar.

4. Listing tools, accessories, and clothing. (Verbal Information)

a. Naming regular tools which cyclists use.
b. Naming specialized tools for bicycles.
c. Naming accessories required for a day tour.
d. Detailing two reasons to wear bicycle-specific clothing.

APPENDIX E

STUDENT MANUAL

BICYCLE BUYING AND FITTING SEMINAR

STUDENT MANUAL

You must be in the market for a bicycle; that's why you're here! We have prepared a short course to enable you to choose wisely when you purchase your "wheels."

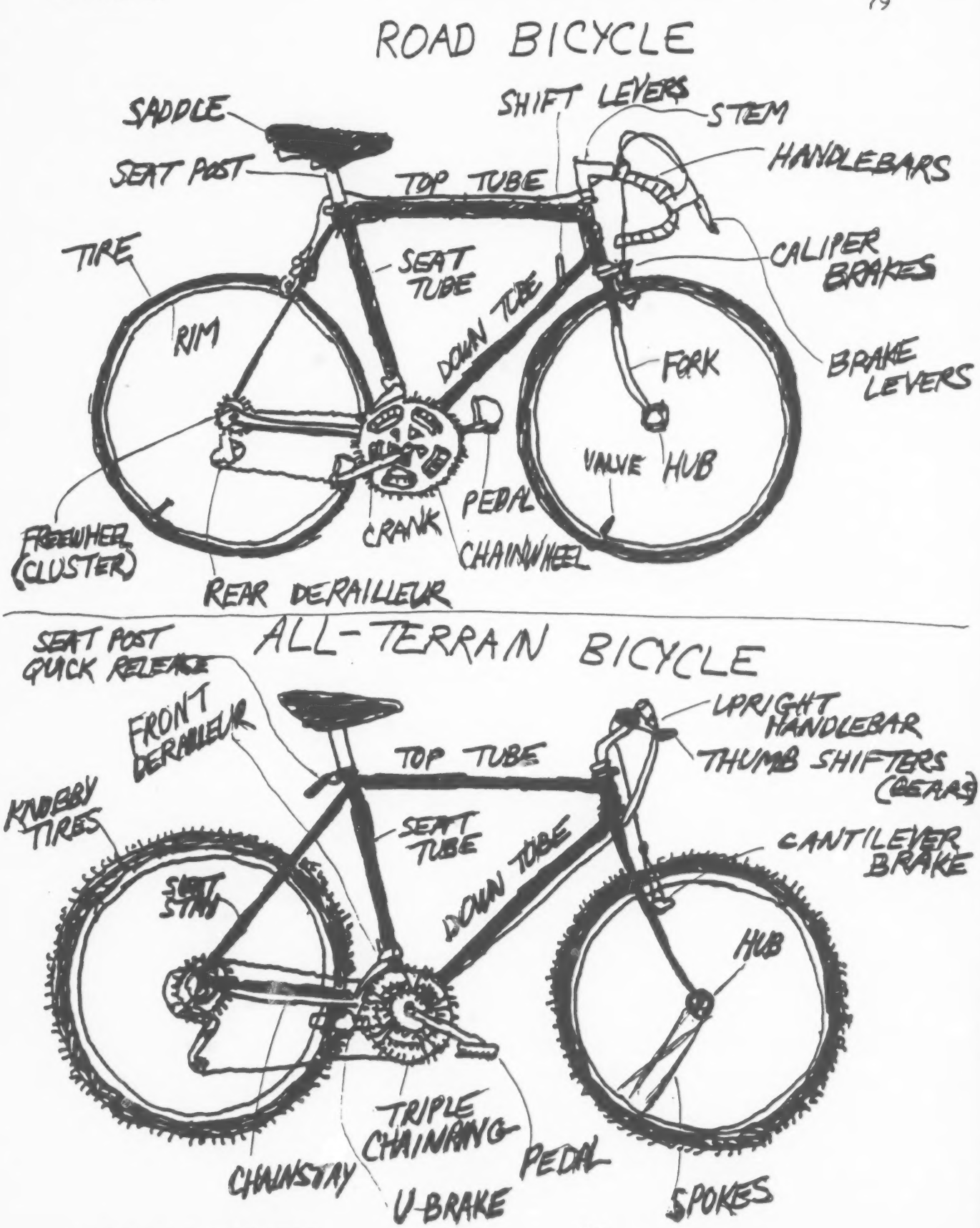
Our objective: To provide you with knowledge on four topics (Nomenclature; Bicycle types; Fitting the bicycle to the rider; Tools, accessories and clothing)--so you can make an informed decision about your bicycle purchase.

We are not here to rate brands of bicycles or cycle shops. You will have to do other research, through magazines or word of mouth, for those opinions. We are only here to provide you with factual information.

Part 1. NOMENCLATURE

See Figure 1 on the next page. After this session, you should be able to identify the frame parts, especially those labeled "tube".

FIGURE 1.



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Part 2. BICYCLE TYPES

There are now four main types of bicycles in use, although some other cyclists might impose further subdivisions. After this session, you should be able to name three significant differences between road and all-terrain bicycles.

The first three types are considered road bikes--for use on paved surfaces.

1. Sport touring--is the biggest "road bike" seller right now. Its dimensions put it about halfway between the pure racing frame and the true "touring" model. It can be a fast machine for club rides, and for those who don't plan to go long distances with luggage, and is more comfortable than the racing machine.

2. Racing--not intended for the beginning cyclist. Has a very harsh ride due to lightness and short wheelbase (see Chart 2). Having one, though, will normally guarantee faster riding.

3. Touring--a longer wheelbase on a slightly heavier machine designed to handle loads for overnight trips. Riding is more comfortable due to wider tires and other adaptations.

4. All-terrain bicycle (ATB)--not a road bike; knobby tires on wider wheels permit use off pavement. One variation, the "city bike," is useful on poorly-paved streets, since the ATB's heavy construction allows a smoother ride. ATB's usually have cantilever brakes, whose arms (unlike those for road bicycles) are attached directly to the frame. ATB's normally come with straight, not "dropped", handlebars. The frame sizing is different from road bikes; you allow more space between you and the top tube, and keep the seat slightly lower.

Chart 1.

Typical dimensions for road and all-terrain bicycles (inches):

	Racing	Sport-Touring	Touring	ATB
Wheelbase	38	40	42	42
Tire width	1	1 1/8	1 1/4	1 1/2-2
Wheel diameter	27	27	27	26
Speeds	10-12	10-18	10-18	12-18
Weight(pounds)	20-22	22-25	24-28	28-32
Price Range (1990)	$600-4000	$400-800	$350-600	$500-1000

Part 3. FITTING BICYCLE TO RIDER.

At the conclusion of this segment, you should be able to identify, in order, the four steps to sizing a bicycle to the rider.

1. Frame size. You should be able to straddle the top tube with one inch of clearance while standing in shoes you intend to wear while riding. The size is equal to the length of the seat tube. For ATB's, provide another inch of clearance.

2. Seat height. For the most efficient use of your legs during pedaling, raise the seat to a point where your knee bends at a slight angle when the pedal is at its lowest point. It should not be so high that your knee locks! From the seat top, to the pedal, should be about 109 per cent of your inseam length. Bring the seat down about another inch for an ATB.

3. Seat fore-and-aft. Viewed from the side, the seat post should bisect the seat; in other words, half of the seat should appear to be in front of the post, the other half behind it. The seat top should also be parallel to the top tube and the ground.

4. Stem length. Once you have finished the third step, put your elbow flush with the nose of your seat. Extend your arm toward the handlebar; your fingertips should just meet the bar. Often, your reach falls short of the bar, and you should opt for a shorter stem so you can reach it.

The bicycle is now properly fitted to you--not the other way around.

Part 4. TOOLS, ACCESSORIES, AND CLOTHING

At the end of this segment, you should be able to identify any three tools used for bicycle maintenance; and three accessories to take on a day ride.

1. Tools.

You probably have some tools for bicycle use already: screwdriver, adjustable wrench, pliers.

Other specialized tools for bicycles include:
Allen (or hex) wrenches
regular-sized wrenches of metric measure
tire irons and patch kit
air pump and pressure gauge
cone wrench
spoke wrench
chain tool (rivet extractor)
freewheel (cluster) remover

2. Accessories.

For your ordinary day trip, you would include these items:
tire irons and patch kit (mentioned above)
air pump and pressure gauge (mentioned above)
helmet
plastic water bottle (and cage to attach to frame)
small first-aid kit
spare tube (make sure the size matches your tires)
bell or horn (for legal requirements)
eyewear (for a sun screen, and an insect and dust deflector)
rear-view mirror (for use on glasses or handlebars)
container (for rear rack or handlebar mounting)

3. Clothing
padded cycling shorts
fitted cycling jersey with back pockets
foul-weather gear (e.g. poncho)
cycling shoes
cycling gloves

Your instructor will provide samples of these tools, accessories, and clothing.

Conclusion

We have provided you with an overview of bicycles and bicycling. We hope that you will be able to enjoy your new possession, whether you use it for recreation, fitness, or commuting. The instructor will be happy to answer any questions you have. Thank you for your participation. Have a great ride!

APPENDIX F

INSTRUCTOR MANUAL

INSTRUCTOR'S GUIDE FOR

BICYCLE BUYING AND FITTING SEMINAR

Welcome! You will cover four main parts of the lesson in the next hour. The course objective is to provide students, who are all adults, basic information which will make them more informed consumers when they purchase their bicycles. Specific objectives for each of the four parts are listed at the beginning of each segment in the student manual. This lesson will be followed by a post test to determine how well students have grasped the new information. You should expect that the group achieves mastery of the subject matter. There will be no pre-test since we are imparting new information to this audience. There will be a control group. Have fun!

NOTES: 1. You are not here to discuss area bicycle shops--their pros and cons. That is not within the scope of the course, and as we're doing this as a service, we need to be impartial. You may discuss your opinions of any stores afterward to individuals, but not in front of the entire class.

2. Before the class: On the demonstration bicycle, loosen the stem, seat post bolt, and seat rail bolts, and then tighten them just enough to hold your "volunteer" rider. You don't want to find that those parts are "seized", and impossible to loosen, during the lesson.

3. Bring a tape measure for the fitting stage, and these tools for the last segment: tire iron and patch kit, tire pressure gauge and high-pressure pump, cone wrench, spoke wrench, freewheel remover, chain rivet extractor, and Allen (hex) wrench.

You should also be able to show these accessories: Helmet, bell, cycling gloves, lights for evening riding, rear rack, rear-view mirror, plastic water bottle, and cycling clothing (shorts, jersey, shoes).

To start: DISTRIBUTE the handout and go over the four parts with the students. Mention that OBJECTIVES for the segments are listed before each part and are related to the post test. Remind students that many already have experience using bicycles, although it may have been years ago.

Place the bicycle before the group and show how a multispeed machine differs from the ones they rode as children and teenagers. Give a quick "preview" of the fourth segment by showing several accessories and tools they will need to make the cycling experience complete.

Part 1. NOMENCLATURE. 10 Minutes.

Refer to Figure 1, the second page of the handout. Explain that this is one part the students will just have to absorb by rote, and will come with use. Mention that, in some cases, parts will have two names (e.g. cluster and freewheel; sew-up and tubular tire). Remind them that they should especially know the tubes of the frame, and the gear mechanisms. Point out as many parts as you can remember, referring the class to the handout's graphic.

At the end of the segment, review those parts with the class. They are expected to know the frame parts labeled "tube."

During the rest of the lesson, make sure you name as many parts as you can, and ask students to name specific parts you point out.

FIGURE 1.

(The second page consists of a graphic showing a road bicycle and an all-terrain bicycle, which is also the second page of the student manual)

Part 2. BICYCLE TYPES. 15 Minutes.

Use Chart 1 below, on a chalkboard or flipchart, to describe the bicycle "family tree." Tell the group that you are assuming they are interested in multi-speed (derailleur) bicycles.

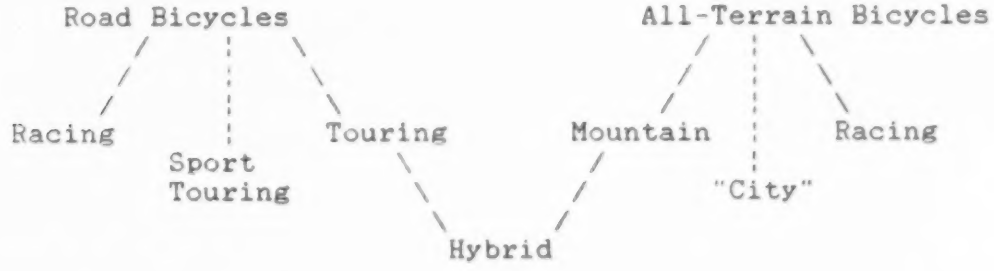
Use a chalkboard or flip chart to list the four groupings of bicycles which are now current:

Sport touring
Racing
Touring
All-terrain (ATB).

Give backgrounds for each, especially frame size, wheels and tires, weight, and the comfort factor. At the end of the lesson, review the differences with the class. They should know that ATB's are distinguished from road bikes by tire tread, handlebar type, brake style, and frame sizing, among other differences.

Mention the recent arrival of hybrids, which combine features of road and all-terrain machines.

CHART 1



Part 3. FITTING THE BICYCLE TO THE RIDER. 20 Minutes.

Find a student who is about the right size for the demonstration bicycle you have. Have this person straddle the frame and explain that there should be one inch space under the crotch, to the top tube, for a road bike; two to three inches for an ATB. Emphasize that students must get the frame size right because all the other measurements for the bicycle are secondary to it. You can't adjust a frame! Explain how to obtain frame size: measure from bottom bracket up to junction of seat post and top tube.

With the same person, adjust the seat height so that the leg is extended enough for maximum efficiency: There's a slight bend to the knee. There are several rules for setting the seat height: 109% of crotch-to-ground measurement (from top of seat to pedal axle); or having a seated rider get heels on horizontal pedals and check that the lower leg is perpendicular to ground. Emphasize that knees should not be locked at the bottom of the foot's pedal stroke, and the rump should not be rocking in the seat. Either "no-no" is evidence that the seat's too high.

Give your volunteer a rest while you pull out the seat post from the frame and show everyone the underside of the seat. Make sure they all see the rails that the seat post can move on, and explain that there's more than an inch of fore-and-aft maneuvering one can do with the seat.

Now show (with your volunteer) how the seat's nose should be about two inches behind a vertical line brought up from the bottom bracket; use the tape measure. This should leave the seat post bisecting the seat. Finally, demonstrate how the seat should be angled so it is parallel to the top tube.

Explain that the stem length can be changed. An especially long stem should be replaced, since the rider could suffer back pain unnecessarily. Demonstrate that a rider's arm, from elbow placed at the seat nose with fingers pointed forward, should just touch the handlebar. Many people will find that the bicycle stem is too long, and you should urge them to replace it with a shorter one.

Review the four steps at the end of the segment. Students should be able to give these four steps in order. Choose one student (other than your volunteer) to demonstrate them with a wrench and tape measure.

Part 4. TOOLS, ACCESSORIES, AND CLOTHING. 15 Minutes.

Here's where you do a quick "show and tell"; mention the items people are likely to have around the house already, such as screwdrivers, crescent (adjustable) wrenches, and pliers.

Make sure that the class understands that when they buy wrench sets, they must be of metric sizes. Demonstrate the use of the Allen (hex) key on any bicycle part; we suggest the stem, to show how the handlebars would be turned for packing in a box when the bicycle goes on a train or plane. Show where and how each specialized bicycle tool is used.

For accessories, first emphasize the importance of a helmet. You probably have some horror stories of your own, but don't be too melodramatic. For a day trip, indicate the necessities and legal requirements: bell or horn, front (white) light and rear (red) light for night cycling.

Also show the class gloves, water bottle, rear carrier rack and/or handlebar bag, rear-view mirror, and pedal toeclips. Discuss the proper fit for cycling shoes--snug and with a stiff sole. Show examples of tight-fitting cycling clothes.

Be sure to review the major points at the end of the segment. Students will be expected to name three tools for bicycle use, and three accessories for a day tour.

Conclusion. You should expect questions from the audience throughout your presentation. This is where you should encourage them. After the questions have ended, give the post test.

As one way to help learning transfer, you should suggest that students contact one another afterwards to check how they have progressed toward the goal: Buying a bicycle. You can also suggest that they contact you for any specific questions.

To show another way they can improve their knowledge of the sport, you should pass around cycling magazines and suggest that they subscribe to one.

Then, thank everyone for their attendance and remind them that, even if they don't visit a bicycle store in the next few weeks, they'll gain from their advanced knowledge of modern bicycling!

APPENDIX G

POST TEST

1990

Post test for Bicycle Buying Course

1. There is one measurement, to fit the bicycle to the rider, which cannot be altered once it is set. All other measurements come after this one. Name it.

   _____

2. True or False: Three major differences between a road bicycle and an all-terrain bicycle are: Type of tire tread, handlebar style, and brake type.
   True_____ False_____

3. Circle the three "tubes" which comprise the triangle in the middle of the bicycle.

   Down, rim, handlebar, top, post, seat.

4. What order of adjustment would you use to fit the bicycle to you? Use 1 for the first adjustment, 2 for the second, through 4 for the last one.
   ____Seat height
   ____Handlebar stem length
   ____Seat position fore-and-aft
   ____Frame size

5. Name any three tools used for bicycle maintenance and repair.

   _____
   _____
   _____

6. Name three accessories (other than tools) you would take on a day bicycle tour.

   _____
   _____
   _____

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